From: Marsh, Karen

Sent: Tuesday, March 27, 2018 02:13 PM

To: Thompson, Lisa; Witt, Jon; Witosky, Matthew; Dewees, Jason; Garwood, Gerri; Shappley, Ned

CC: Davis, Alison; Sorrell, Virginia; Mia, Marcia

Subject: FW: Stanford OGI Whitepaper

Attachments: IMG_2653.jpg; IMG_2652.jpg; IMG_2648.jpg; Designing better methane mitigation policies - the challenge of.pdf; Arvind Article on comparing natural gas leak detection technologies.pdf; Are Optical Gas Imaging Technologies Effective For Methane Leak Detection.pdf

All,

Ex. 5 Deliberative Process (DP)

Ex. 5 Deliberative Process (DP)

Ex. 5 Deliberative Process (DP)

Ex. 5 Deliberative Process (DP)

Thanks!

Karen

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Karen R. Marsh, PE

US EPA, OAQPS, Sectors Policies and Programs Division

Fuels and Incineration Group

109 TW Alexander Drive, Mail Code E143-05

Research Triangle Park, NC 27711

Direct: (919) 541-1065; email: marsh.karen@epa.gov

From: Andrew Cunningham [mailto:ACunningham@gasleaksensors.com]

Sent: Friday, March 23, 2018 11:52 AM

To: Marsh, Karen <Marsh.Karen@epa.gov>

Subject: Stanford OGI Whitepaper

Hi Karen,

Further to our telephone conversation, please find attached the OGI whitepaper I mentioned that Arvind Ravikumar at Stanford recently published. I've also attached a couple of other papers of his you might find interesting and a few pictures of our latest generation of OGI products that are in the final stages of development.

Looking forward to catching up at the 4C Conference in a couple of weeks.

All the best,

Andrew Cunningham

Manager, Business Development

SENSIT Technologies LLC

acunningham@gasleaksensors.com

519-851-8984

From: Marsh, Karen <Marsh.Karen@epa.gov>

Sent: January 2, 2018 12:42 PM

To: Andrew Cunningham

Subject: RE: Optical Gas Imaging Camera System - SENSIT Technologies

Andrew,

Sorry for the late response. The 50/50 blend of methane/propane is only required for the verification by the manufacturer. Could you use methane cylinders that are available for calibration of the TVAs when Method 21 is used? That's the only non-propane option I can think of that might be helpful for you. Unfortunately, with the absorption range of your camera, that might prove a limiting factor for getting the camera in the field with operators.

Karen

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Karen R. Marsh, PE

US EPA, OAQPS, Sectors Policies and Programs Division

Fuels and Incineration Group

109 TW Alexander Drive, Mail Code E143-05

Research Triangle Park, NC 27711

Direct: (919) 541-1065; email: marsh.karen@epa.gov

From: Andrew Cunningham [mailto:ACunningham@gasleaksensors.com]

Sent: Friday, November 03, 2017 9:29 AM

To: Marsh, Karen <Marsh.Karen@epa.gov>

Subject: Re: Optical Gas Imaging Camera System - SENSIT Technologies

Hi Karen,

Thanks for that information. We had a similar 3rd party test completed by ENAGAS in Spain. Attached are the results of that test. It seems this information - in addition to actual field validation - is sufficient for most prospective customers.

Unfortunately getting a relatively inexpensive commercially available 5000/5000PPM blend of CH4 and C3H8 seems to be REALLY hard! Do you know of anyone who actively stocks this blend? Because what we've run into is people using inexpensive 100% propane camping fuel canisters in the field and of course this doesn't work for us as our relative absorption of propane is quite low for such a small concentration. Any help here would be greatly appreciated. Thanks again.

All the best,

Andrew Cunningham

Manager, Business Development

SENSIT Technologies, LLC

acunningham@gasleaksensors.com

519-851-8984

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From: Marsh, Karen <Marsh.Karen@epa.gov>

Sent: Thursday, November 2, 2017 11:34 AM

To: Andrew Cunningham

Subject: RE: Optical Gas Imaging Camera System - SENSIT Technologies

Andrew,

Check out this presentation from OpGal from 4C last year (you should attend if you haven't in the past). Slides 6-16 walk through the testing that OpGal performed to demonstrate as the manufacturer that their camera meets the specifications in OOOOa. FLIR has done something similar but I can't seem to put my hands on it.

http://content.4cmarketplace.com/presentations/LDAR6Yanai_Omer_OPGAL_OGIBeyondtheVisible.pdf

The basic testing that companies will probably look for is outlined in 60.5397a(c)(7)(i)(A) and (B).

"Verification that your optical gas imaging equipment meets the specifications of paragraphs (c)(7)(i)(A) and (B) of this section. This verification is an initial verification and may either by performed by the facility, by the manufacturer, or by a third party. For the purposes of complying with the fugitive emissions monitoring program with optical gas imaging, a fugitive emissions is defined as any visible emissions observed using optical gas imaging.

(A) Your optical gas imaging equipment must be capable of imaging gases in the spectral range for the compound of highest concentration in the potential fugitive emissions

(B) Your optical gas imaging equipment must be capable of imaging a gas that is half methane, half propane at a concentration of 10,000 ppm at a flow rate of ≤60 g/hr from a quarter inch diameter orifice."

If you can demonstrate that, then the camera is good to go as far as we are concerned.

I hope this helps.

Karen

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Karen R. Marsh, PE

US EPA, OAQPS, Sectors Policies and Programs Division

Fuels and Incineration Group

109 TW Alexander Drive, Mail Code E143-05

Research Triangle Park, NC 27711

Direct: (919) 541-1065; email: marsh.karen@epa.gov

From: Andrew Cunningham [mailto:ACunningham@gasleaksensors.com]

Sent: Thursday, November 02, 2017 9:52 AM

To: Marsh, Karen <Marsh.Karen@epa.gov>

Subject: Re: Optical Gas Imaging Camera System - SENSIT Technologies

Great, thanks Karen! Appreciate your help.

Talk soon,

Andrew

Sent via the BlackBerry Hub for Android

From: Marsh.Karen@epa.gov

Sent: October 31, 2017 9:24 AM

To: ACunningham@gasleaksensors.com

Subject: RE: Optical Gas Imaging Camera System - SENSIT Technologies

Hi Andrew,

I'm guessing that you made some good contacts last week at the Gas Star meeting. I'm glad that worked out.

I need to look back through my email but I've seen some information from OpGal and FLIR where they tested their cameras to demonstrate they can meet the requirements. Both have been shared publicly so if I can find that I'll forward it since it would be what industry would compare you to. It may take me a day or two because I'm in back to back meetings today.

Karen

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Karen R. Marsh, PE

US EPA, OAQPS, Sectors Policies and Programs Division

Fuels and Incineration Group

109 TW Alexander Drive, Mail Code E143-05

Research Triangle Park, NC 27711

Direct: (919) 541-1065; email: marsh.karen@epa.gov

From: Andrew Cunningham [mailto:ACunningham@gasleaksensors.com]

Sent: Tuesday, October 31, 2017 8:54 AM

To: Marsh, Karen <Marsh.Karen@epa.gov>

Subject: Fw: Optical Gas Imaging Camera System - SENSIT Technologies

Hi Karen,

Any insight on how we can address Jim's concerns below regarding our OGI's acceptability for use under Subpart W and OOOOa? I know you previously mentioned that the EPA does not endorse or test individual OGI's and we'll be sending Jim a video of our OOOOa simulation later today but I wanted to get your thoughts on how best to address these types of inquiries. Any ideas are greatly appreciated.

All the best,

Andrew Cunningham

Manager, Business Development

SENSIT Technologies, LLC

acunningham@gasleaksensors.com

519-851-8984

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From: Tangeman, James G (Jim) <James_Tangeman@kindermorgan.com>

Sent: Monday, October 30, 2017 5:57 PM

To: Andrew Cunningham

Subject: RE: Optical Gas Imaging Camera System - SENSIT Technologies

Andrew,

Thank you for sending me the brochures below. I wanted to followup to our discussion last week at the Gas STAR conference in Houston about sending me some test results on your new OGI camera system and any EPA documentation that you have showing that your new OGI camera system is an acceptable alternative to the FLIR or OpGal OGI cameras to comply with the Subpart W GHGRP surveys and NSPS Subpart OOOOa surveys. This would definitely help with furthering our discussions.

Thanks

Jim

Jim Tangeman | EHS Manager | Greenhouse Gas - Methane Program

km_inc_1

Natural Gas Pipelines

2 North Nevada Avenue | Colorado Springs, CO 80903

370 Van Gordon Street | Lakewood, CO 80228

Colorado Springs Office: 719-520-4769| Lakewood Office: 303-914-7788 |Cell: 719-425-6601

James_Tangeman@KinderMorgan.com

Safety Focus Area: REMEMBER - When Driving, Driving is the Job and Actively use Smith Safe Driving Keys

Second & Third Quarter 2017 GHG-Methane Focus Area: Implementation, Training and Support of ONE Future-Methane Challenge Program

From: Andrew Cunningham [mailto:ACunningham@gasleaksensors.com]

Sent: Thursday, October 26, 2017 10:21 AM

To: Tangeman, James G (Jim)

Subject: Optical Gas Imaging Camera System - SENSIT Technologies

[This email message was received from the Internet and came from outside of Kinder Morgan]

Hi Jim,

Further to our conversation yesterday at the Natural Gas STAR Workshop, please find attached a technical datasheet on our Optical Gas Imaging (OGI) camera system. If you'd like to see a camera in the field we'd be happy to stop by one of your facilities for some head to head testing against your current OGI cameras. I've also attached a couple of data sheets on our TDLS based leak detection products. Don't hesitate to give me a call if you have any questions. Thanks for your interest.

All the best,

Andrew Cunningham

Manager, Business Development

SENSIT Technologies, LLC

acunningham@gasleaksensors.com

519-851-8984